

IN THE CLAIMS

This listing of claims replaces all prior listings:

1. (currently amended) A method for manufacturing a magnetic memory device comprising the steps of:

forming a first wiring on a substrate;

forming a magnetoresistance effect type memory element which comprises a tunnel insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein said method further comprises the steps of:

removing the insulating film on a side portion of the second wiring to expose the second wiring; and

forming a soft magnetic material layer selectively only on a side surface and a top surface of the second wiring, but not as a continuous layer from the second wiring to another second wiring.

2. (original) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said magnetic memory device is a nonvolatile magnetic memory device.

3. (original) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said soft magnetic material layer is formed by an electroless plating process.

4. (original) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said insulating film on the side portion of the second wiring comprises an etching stopper layer and an interlayer insulating layer formed on the etching stopper layer; and

etching is once stopped when removing said interlayer insulating layer at step for

removing the insulating film on the side portion of the second wiring to expose the second wiring.

5. (original) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said second wiring is formed in a trench formed on said insulating film via a barrier layer;
and

said barrier layer on the side portion of the second wiring is removed after said insulating film is removed and before said soft magnetic material layer is formed.

6. (currently amended) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said second wiring is formed in a trench formed on said insulating film via a barrier layer;
said method for manufacturing a magnetic memory device further comprises the step of forming a mask pattern between said second wirings after said insulating film is removed and before said soft magnetic material layer is formed; and

said step for forming the soft magnetic material layer on the surface of the second wiring comprises the steps of:

forming the soft magnetic material layer selectively ~~only~~ on the side surface and the top surface of the second wiring while using said mask pattern as a mask; and

removing said mask pattern after that.

7. (currently amended) The method for manufacturing a magnetic memory device as cited in claim 1, wherein:

said second wiring is formed in a trench formed on said insulating film via a barrier layer;
said method for manufacturing a magnetic memory device further comprises, after said insulating film is removed and before said soft magnetic material layer is formed, the steps of:

removing said barrier layer on the side portion of the second wiring; and
forming a mask pattern between said second wirings; and

said step for forming the soft magnetic material layer on the surface of the second wiring comprises the steps of:

forming the soft magnetic material layer selectively ~~only~~ on the side surface and the top surface of the second wiring while using said mask pattern as a mask; and

removing said mask pattern after that.

8. (withdrawn) A method for manufacturing a magnetic memory device, comprising the steps of:

forming a first wiring;

forming a magnetoresistance effect type memory element which comprises a tunnel insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein the second wiring is formed through a barrier layer in a trench formed in the insulating film, wherein said method further comprises the steps of:

removing the barrier layer on a sidewall of the second wiring to form a trench so that the sidewall of the second wiring is exposed; and

forming a soft magnetic material layer selectively only on a surface including the sidewall of the second wiring while filling the trench.

9. (withdrawn) The method for manufacturing a magnetic memory device as cited in claim 8, wherein:

said magnetic memory device is a nonvolatile magnetic memory device.

10. (withdrawn) The method for manufacturing a magnetic memory device as cited in claim 8, wherein:

said step for forming the trench comprises the step of forming said trench on the sidewall of the second wiring by removing said barrier layer on the sidewall of the second wiring as well as by removing said insulating layer of adjacent said barrier layer.

11. (withdrawn) A method for manufacturing a magnetic memory device comprising the steps of:

forming a first wiring;

forming a magnetoresistance effect type memory element which comprises a tunnel

insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein said step for forming said second wiring comprises the steps of:

forming a barrier layer in a trench for forming said second wiring formed on the insulating film;

forming a soft magnetic material layer on a side wall of the trench via said barrier layer; and

forming said second wiring in said trench via said barrier layer and said soft magnetic material layer; and further comprises a step of selectively forming a soft magnetic material layer after said second wiring is formed.

12. (withdrawn) The method for manufacturing a magnetic memory device as cited in claim 11, wherein:

said magnetic memory device is a nonvolatile magnetic memory device.

13. (withdrawn) The method for manufacturing a magnetic memory device as cited in claim 11, wherein:

said soft magnetic material layer is selectively formed by an electroless plating process.

14. (withdrawn) The method for manufacturing a magnetic memory device as cited in claim 11, wherein:

said step for selectively forming the soft magnetic material layer comprises the steps of: forming a mask pattern on the insulating layer of other than said second wiring;

selectively forming the soft magnetic material layer only on the second wiring by electroless plating while using said mask pattern as a mask; and

removing said mask pattern.

15. (withdrawn) A magnetic memory device manufactured by a method comprising the steps of:

forming a first wiring;

forming a magnetoresistance effect type memory element which comprises a tunnel insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein said method further comprises the steps of:

removing the insulating film on a side portion of the second wiring to expose the second wiring; and

forming a soft magnetic material layer selectively only on a surface of the second wiring.

16. (withdrawn) The magnetic memory device as cited in claim 15, wherein:
said magnetic memory device is a nonvolatile magnetic memory device.

17. (withdrawn) The magnetic memory device as cited in claim 15, wherein:
said soft magnetic material layer is formed by an electroless plating process.

18. (withdrawn) A magnetic memory device manufactured by a method comprising the steps of:

forming a first wiring;

forming a magnetoresistance effect type memory element which comprises a tunnel insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein the second wiring is formed through a barrier layer in a trench formed in the insulating film, wherein said method further comprises the steps of:

removing the barrier layer on a sidewall of the second wiring to form a trench so that the sidewall of the second wiring is exposed; and

forming a soft magnetic material layer selectively only on a surface including the sidewall of the second wiring while filling the trench.

19. (withdrawn) The magnetic memory device manufactured by a method comprising the steps of:

forming a first wiring;

forming a magnetoresistance effect type memory element which comprises a tunnel insulating layer disposed between a ferromagnetic material and which is electrically insulated from the first wiring;

forming an insulating film for covering the memory element; and

forming a second wiring so that it is buried in the insulating film wherein the second wiring is electrically connected to the memory element and spatially crosses the first wiring through the memory element disposed therebetween, wherein said step for forming said second wiring comprises the steps of:

forming a barrier layer in a trench for forming said second wiring formed on the insulating film;

forming a soft magnetic material layer on a side wall of the trench via said barrier layer; and

forming said second wiring in said trench via said barrier layer and said soft magnetic material layer; and further comprises a step of selectively forming a soft magnetic material layer after said second wiring is formed.

20. (withdrawn) The magnetic memory device as cited in claim 19, wherein:

said soft magnetic material layer is selectively formed by an electroless plating process.